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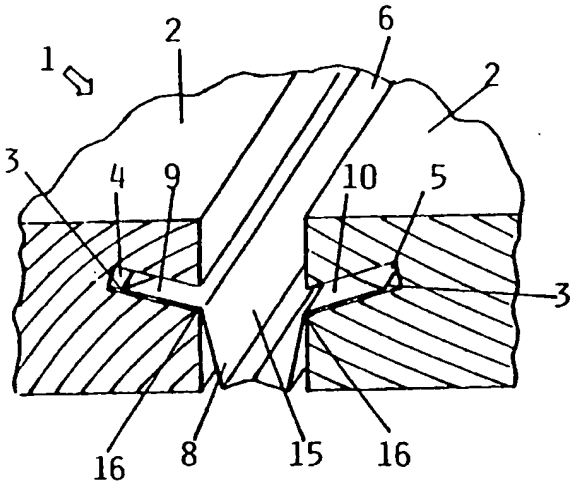
(57) Abstract

A sealing strip (8) for use between boards (2) arranged parallel to, but at a certain distance (6) from, one another, so that the boards (2) constitute a plane surface (1), and where each bord (2) is provided with at least one longitudinal groove (4, 5) along the entire length of its side edges, which grooves are adapted to receive protruding extensions (9, 10) of the sealing strip (8). The sealing strip (8) which is made as one single unit, is impermeable and comprises a central, laterally elastic portion (11) having a width which can be both expanded and contracted due to elastic deformation when exposed to external, mechanical loads. The central portion (11) is provided with at least two protruding extensions (9, 10) which are adapted to be received in a sealing manner in the corresponding grooves (4, 5) in two adjacent boards (2).



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SEALING STRIP

The present invention relates to a sealing strip adapted for sealing the longitudinal intervals between two parallel boards or planks, and in particular for sealing between planks or boards in a terrace structure.

When wood terraces for different uses are designed, planks, usually of pressure-impregnated type, are arranged across all supporting beams at suitable intervals. One of the reasons why the boards are positioned at certain intervals is that the boards are to be allowed to move a little during extensions and contractions caused by change in humidity, and the boards should also be allowed to move a little during changing load and temperature conditions. Finally it should be mentioned that the boards are arranged at intervals to allow water and snow to find a discharge possibility to avoid puddles forming in the middle of the terrace, which would lead to an accelerated decomposition of the materials in the terrace boards.

In practical use such wood terraces have many defficiencies. The following disadvantages may be mentioned.

Dirt such as falling leaves and other particles will gather in between the terrace boards and lead to unhygenic conditions below the terrace. This is in particular a disadvantage when the terrace is situated close to the ground, making it difficult or impossible to clean the area under the terrace, and at locations where people make passage or sojourn below the terrace.

Water and light which pass through the slots in the terrace lead to the growth of weeds which after a while grow up through the slots between the terrace boards. It is very difficult to get rid of such weeds, a problem which also is most pronounced when the terrace is situated close to the ground.

Coins, jewelry such as rings etc., may easily fall down between the terrace boards, and recovery of such objects is very difficult or impossible. This problem is also more difficult when the terrace is built close above the ground or stands on short pillars.

Animals such as cats may make their resort under such terraces, which may lead to disagreeable fumes causing discomfort for the those using the terrace. In particular for terraces used for social meetings such conditions are not acceptable.

A further problem with existing terrace structures is that the boards will curve concavely upwards so that nails and other fastening devices are forced up from the boards when they move during changes in humidity and load conditions.

This last mentioned problem develops as the boards in conventional terrace constructions after some time contract more on their upper surface than on their lower surface. After some while the consequence is that the nails are forced up from the supporting structure leading to corresponding disadvantages.

Also the last mentioned problem is remedied by the present invention. As the lower surface of the boards are kept dry, it has been found that the boards remain plane or curve convexly upwards only to a small extent. This is probably due to the fact that a compact terrace increases the flow of air below the terrace, resulting in a correspondingly fast drying process on terraces arranged both on a plane surface and on free ground. These conditions contribute to a much more endurable terrace which also retains a better appearance after use.

Water which gathers on the terrace boards on the conventional terrace, will penetrate to the supporting beams below the terrace boards. After some time humidity will damage the beams which may decay and the humidity may also follow the beams back into adjoining structures as buildings etc. This is a disadvantage leading to high maintenance costs and also to accidents as the damage often is not registered until it is very serious.

To avoid at least the last mentioned problem an impermeable layer, for instance of metal or a weldable roof covering, is postioned below the terrace construction. Such solutions increase the costs and leads to a heavier construction, which is disadvantageous in different manners.

The use of different types of sealing elements between floorboards and terrace boards is previously known. In this connection reference is made to German patent DE 102.394, British patent GB 1.311.487 and Swedish published application 462.809.

German patent No. DE 102.394 relates to a sealing bar adapted for use in connection with completely compact floors within buildings. The shown sealing element is apparently completely stiff and is penetrated by openings for fastening screws. Therefore an element according to this patent would not prevent leaking if used out of doors.

U.K. patent No. 1.311.487 relates to a sealing element which also is designed to obtain a tight seal between floorboards. However, this element is made in two parts, each consisting of one hard portion and one soft portion. Such an element would not give any durable sealing between terrace boards used out of doors and exposed to high temperatures, very low temperatures, and long-lasting precipitation.

Swedish published application No. 462.809 relates to a stiff tightening bar which in fact allows the adjacent planks to be broken along pre-manufactured weakening sections in the boards. Therefore, it seems impossible to obtain a quite impermeable sealing when the boards afterwards contract, for instance during a dry period.

The sealing strip according to the present invention is in particular developed to be used together with pressure impregnated wood. Therefore, the sealing strip is designed in such a manner that contracting of the wood material enhances the sealing effect of the sealing strip as barbed sections are forced into the wooden boards during the contracting process.

In addition the sealing strip is, according to a preferred embodiment, shaped in such a manner that when the wood material expands the strip will be squeezed and deformed in such a manner that the side edge of said strip will be compressed harder into the wood material the more the wood material expands. Due to these two features a complete tightening will be obtained during all conditions.

The sealing strip according to the present invention also results in minimal curving of the boards.

The object of the present invention is to provide a sealing strip adapted for use between terrace boards in such a manner that all the disadvantages mentioned above are avoided. In other words the objects are to provide a water-tight and flat terrace of wood and in particular of impregnated wood in a simple and inexpensive manner.

All these objects are met by forming the sealing strip according the patent claims below.

To obtain a more clear and unambiguous understanding of this present invention reference is made below to a detailed description of some preferred embodiments of such a sealing strip, and to the accompanying drawings in which:

Fig. 1 shows a sealing strip according to the present invention mounted between two terrace boards having milled out grooves,

Fig. 2 shows in more detail a sealing strip of the type shown in fig. 1,

Fig. 3 shows a sealing strip of a somewhat different embodiment,

Fig. 4 shows a sealing strip of a still further embodiment, however also in accordance with the present invention and,

Fig. 5 shows an auxiliary fitting for transportation of water away from terraces of the above described type.

It should be noted that the same reference numbers are used on all drawings when convenient. Further it is noted that details of the structure which are not absolutely necessary to understand the present invention may be avoided on the drawings to reduce their complexity. Finally it should be noted that the scale of the different drawings is not necessarily the same.

Fig. 1 shows a portion of a terrace 1 made of parallel boards 2 of which only two parallel boards are shown on the figure. The boards shown are provided with inclined grooves 4,5 having such a design that when two boards 2 are positioned alongside each other the two grooves 4,5 represent

symetrical recesses at the same level in the two adjacent boards 2.

A pre-manufactured strip 8 is shown introduced in the interval 6 between the two boards 2 in such a manner that the side edges 3 of said strip 8 are forced into the grooves 4,5 in the adjacent boards 2 while a channel-shaped portion 15, in the middle of said strip or fitting 8, defines a downward curved flow channel between the two boards. It should be mentioned that the strip 8 preferrably has approximately the same length as the boards 2, and therefore extends without interruptions from one end of the board to the opposite. Using a terrace 1 with such a construction, all the objects and features mentioned above are met. Accordingly jewelry or rings cannot fall down between the boards of the terrace as they will be caught by the strip and may easily be picked up. Falling leaves and dirt falling down into the intervals between the boards can easily be flushed out and swept away or to any side. Water falling down on the terrace 1 will flow down into the channels 15 and will easily be removed. In this connection it should be mentioned that the complete terrace preferrably may be erected in such a manner that it is inclined somewhat in one direction or to both directions. Such a construction will account for a natural flow away from the terrace. It should also be mentioned that neither light nor water will flow in under the terrace, and due to this fact the ground below the terrace receives neither water nor light and therefore the growth of weeds below the terrace is strongly reduced.

In spite of these advantages the lateral elasticity in the channel of said strip will adjust to the small natural movements which all biological material makes during normal use.

In Fig. 2 the cross section of the sealing strip 8 is shown in more detail.

It is deemed to be very advantageous to provide the strip or fitting 8 with an acute angled break along its logitudinal side edges 3 which are folded sharply so that the strip 8 obtains a portion of an acute angle α, preferrably approximately 15°, along both side edges. The folded portion

of the side edge, on the figure extending from reference 3 to reference 14, has a width which slightly exceeds the width of the grooves 4,5. This will lead to a number of advantages mentioned below.

The outer, sharp edges along the outer side edges 3 of the strip 8 will act as barbs which may easily be pushed from the side into the grooves 4,5, but cannot be pulled out without taking special precautions. Again it should be pointed out that the folded edge has such a dimension that it must be forced into the corresponding groove 4,5. According to this the side edges 3 will not be pulled out from the corresponding grooves 4 and 5 when the terrace boards 2 contract, for instance because they are getting dry. The folded edge 14 will instead be subjected to a force which results in a minor extension of the angle α while the side edge 3 is forced still more tightly and closely to the inner surface of the grooves 4 and 5. Instead, the strip 8 will be deformed at the bottom of the channel 15. The elasticity of the strip will here allow the profile to open somewhat, so that the boards 2 may move a little from each other while the channel 15 in fact is more thoroughly tightened along its upper brim.

When the sealing strip has a shape as shown in Fig. 2 the sealing between the strip 8 and the grooves 4 and 5 in the boards 2 will in fact be enhanced also when the boards 2 are forced sideways towards each other, for instance when increased humidity occurs. This may be explained as follows:

When the boards 2,2 move towards each other, the corners 16 (fig.1) are forced inwardly towards the folded lines 17 on the strip 8, which lines are positioned in the upper part of the channel shaped portion 15. Accordingly the side wall of the strip 8 will curve, and as a result the edge 3 will be forced still harder against the wood in the boards 2. The result is that the sealing between the groove and the strip will be enhanced both when the boards 2 move towards each other and when the boards 2 move from each other. It should be emphasized that this sealing already initially is so effective that it will prevent passage of water, as the folded brim 3-14 has such dimensions that it is broader than

the width of the groove 4 and 5 while the material of the strip is elastic and is forced outwardly towards the edge of the grooves in a pre-stressed manner.

The sealing strip 8 may preferrably be designed exactly as shown in Fig. 2. It is then seen that the angle $\alpha \approx 15°$ is repeated many places in the cross-section. The outer folded brim has an angle α related to the adjacent flat area of the protrusion 9,10. The side walls in the channel 15 also in turn make an angle α related to the vertical plane. Further the bottom of the channel 15 makes an angle α related to the horizontal plane.

Using the shape shown the boards will be retained at a mutual distance 18 when outer stress does not occur. When the boards expand this distance may be reduced to the width 19 at the bottom of the channel 15. And when this bottom has a curved portion as shown 20, the distance between the boards may be reduced still further. In a similar manner the distance between the boards may also increase to exceed the distance 18 when the boards 2 contract. All the time the elastic strip will follow the movements and seal tightly to the adjacent boards without making any gap. Water falling down on the terrace will flow away along all the channels 15.

However, different shapes may be used for the cross-section of the strip 8. As possible modifications may be mentioned that the bottom of the channel 15 may be flat or wave-shaped, the side edges 3 may be folded downwards instead of upwards. The strip 8 may be extruded having one portion folded upwards at 3 and one portion downwards at 3'and some of the folding lines as 17 and/or 20 may be completely omitted.

When the terrace 1 is loaded, any bending and movement of the strip 8 will result in a better sealing against the encompassing wood. This may be best understood if the situation without such a folded or sharply bent edge 3 is considered. In this case a movement of the boards relative to each other will make the protrusion on the strip 8 to move out of the grooves 4,5 which results in poor sealing, which in turn will make water flow out above the channel of the strip and contact the wood in the grooves 4 and 5 and thereafter also

the under side of the boards 2. With a folded side edge 3 shaped to be forced into the groove 4,5 in the terrace boards 2 this situation will be avoided in all loading conditions.

It should also be mentioned that a channel shaped portion 15 having a substantially rectangular cross section as assumed in Fig. 1 and 2, is deemed to be the best embodiment. This shape will give good flow conditions and it will also give the strip a great sideways flexibility when the boards are loaded in such a manner that they will move away from each other. The shown cross section design of the strip 8 therefore will give a very high freedom of relative movement even if the strip fastens at both folded brims 3 in the material of the board 2. It is preferred that channel 15 is somewhat more narrow near its bottom than in its upper parts, as such a design will enhance the effects described above. The sealing strip according to this invention is advantageous as such a strip represents a very useful remedy when terraces are to be built, as it secures a constant distance between all of the terrace boards along their complete length. A terrace built by means of such channel-shaped fittings therefore will obtain a better aesthetic appearance than a terrace built without such fittings. However, such a seal may also be provided on already existing terraces which initially were built without such sealing strips. Then a profile mill may be guided in between two adjacent boards and guidedalong these boards while grooves are milled out in both board edges at the same time. When such grooves are milled out a strip may be pushed down into the gap from above. Due to the intrinsic elasticity of the strip, the sealing strip will expand when pressed down and a correct position in said milled out grooves will be obtained.

Many different cross-section designs may be used for the grooves, and for the strip or fitting. Some modifications are shown in Fig. 2-4. Fig. 3 shows a strip having a wavey bottom, and Fig. 4 illustrates a strip with an evenly tilting bottom. Still further cross-sections may be provided within the scope of the present invention. The strip may for instance be flat along its complete width, as also such a design will allow some sideways movement between the terrace boards,

in particular when the channel 15 is wider at its top than at its bottom.

Finally it may be mentioned that the terrace may be finished according to the design shown in Fig. 5. Here an end fitting 16 leads the flow of water to the edge of the terrace. On said figure is shown an end duct 16 arranged across of all the sealing strips 8.

The fitting or strip according to the present invention may be made from different materials. One possible and suitable material is an iron plate having a protection of plastic, possibly with structured surface, and being for instance 0.5 mm thick. Galvanized metal plates 0.5 - 1 mm thick are also well suited. Still further materials may be plastic materials and laminates. Extruded strips of low weight metal, for instance aluminium, may also be used. It is preferred that the material has an even surface which may easily be cleaned, and it should preferrably be chosen from among materials enduring the required stress and temperature loads which are usual in buildings. Similarly the elasticity of the strip is important, as it should press back towards the grooves 4,5 when mounted.

The grooves which are made in the side edges of the terrace boards may also have different designs. The grooves may for instance be tilted upwards as shown on the examples or they may be arranged horizontally. The grooves may also have a less deep and more open shape. Combinations of the different shown shapes of said grooves and said strips may also be used without diverting from the scope of said invention.

More than one single groove 4,5 may also be arranged in each board 2. In such cicumstances the strip 8 may be provided with more that one protrusion 9,10 on each side.

C l a i m s

1. A sealing strip (8) adapted for use between boards (2) arranged parallel to, but at a certain distance (6) from, one another, so that the boards (2) constitute a flat surface (1), and where each board (2) is provided with at least one longitudinal groove (4,5) along the entire length of its side edges, which grooves are adapted to receive protruding extensions (9,10) of the sealing strip (8),
c h a r a c t e r i z e d in that
- the sealing strip (8) which is made as one single unit, is impermeable and comprises a lateraly elastic portion (11) having a width which both can be expanded and contracted due to elastic deformation when exposed to external, mechanical loads, and that
- the central portion (11) is provided with at least two protruding extensions (9,10) which are adapted to be received in a sealing manner in corresponding grooves (4,5) in two adjacent boards (2).

2. A sealing strip (8) as stated in claim 1,
c h a r a c t e r i z e d in that the protrusions (9,10) are provided with resilient compressible and expandable side brims (3) which in an unloaded condition have a width somewhat broader than the width of the grooves (4,5) which the protrusions (9,10) are adapted to co-operate with.

3. A sealing strip (8) as claimed in claim 2,
c h a r a c t e r i z e d in that it comprises a thin, longitudinally folded elastic element, the central portion of which is W-shaped while the protrusions are V-shaped and have a width exceeding the width of the grooves (4,5) in the boards (2).

4. A sealing strip (8) as stated in claim 1, 2 or 3, c h a r a c t e r i z e d in that the central, elastic portion (11) is provided with a central, impervious channel (15) having a depth extending from the grooves (4,5) to the lower surface of the boards (2).

5. A sealing strip (8) according to claim 4, c h a r a c t e r i z e d in that the channel (15) has a higher upper width than lower width.

6. A sealing strip as claimed in one of the claims 1-5, c h a r a c t e r i z e d in that the protrusions (9,10) are provided with elastically folded acute angled ($\angle = \alpha$) brims (3-14) with sharp side edges (3) adapted to be pressed into the surface of the corresponding groove (4,5) due to its own intrinsic elasticity.

7. A sealing strip (8) as stated in claim 6, c h a r a c t e r i z e d in that the groove (4,5) has a width 2-4 mm less than the width of the acute angled folded brim (3-14) in an unloaded condition.

8. A sealing strip (8) as stated in one of the claims 6-7, c h a r a c t e r i z e d in that the folded brim (3-14) is bent upwardly.

9. A sealing strip (8) as stated in one of the claims 1-8, c h a r a c t e r i z e d in that the protrusions (9,10) and the grooves (4,5) tilt upwardly from the horizontal plane at and acute angle ($\angle = \alpha$).

10. A sealing strip (8) as stated in one of the claims 6 or 8, c h a r a c t e r i z e d in that the acute angle ($\angle = \alpha$) is approximately 15°.

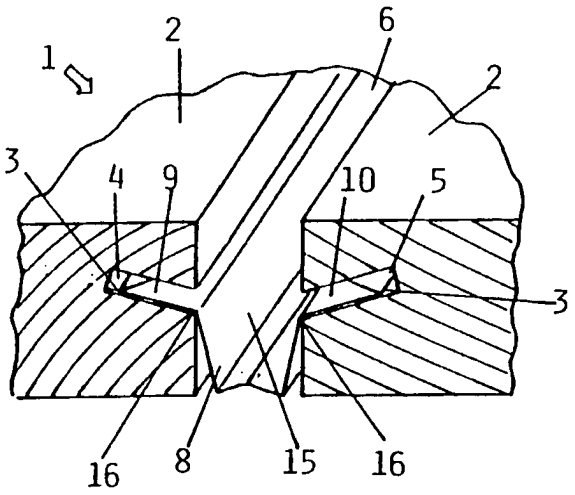

FIG. 1

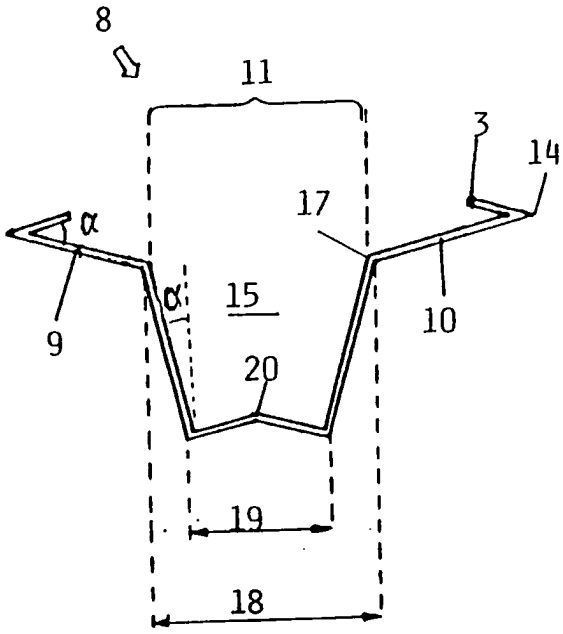

FIG. 2

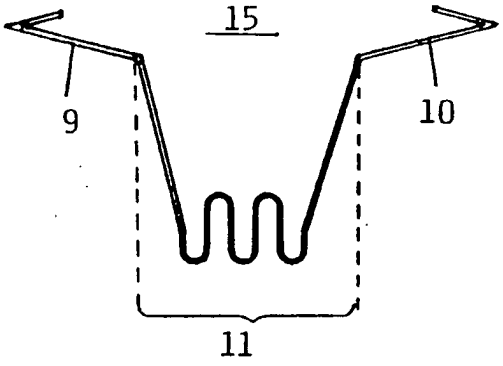

FIG. 3

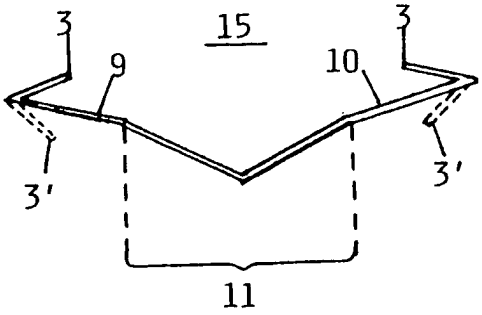

FIG. 4

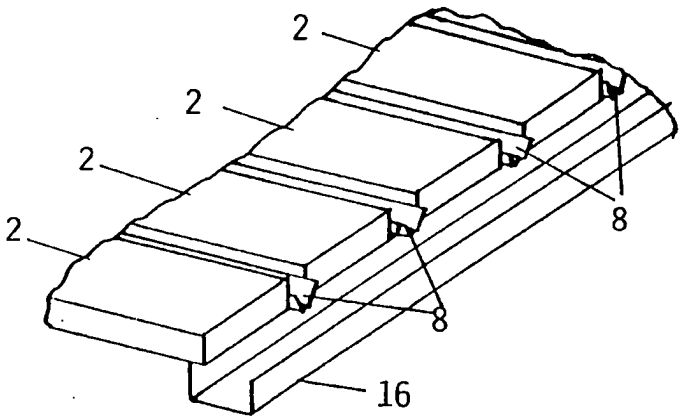

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 94/00108

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: E04F 15/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SE, B, 304100 (A. BJÖRN), 16 Sept 1968 (16.09.68), page 1, line 4 - line 10 --	1-10
X	US, A, 3412515 (P.M.P. FINON), 26 November 1968 (26.11.68), column 1, line 38 - line 60; column 2, line 60 - line 68 --	1-10
X	EP, A2, 0121915 (INTER-IKEA AG), 17 October 1984 (17.10.84), page 2, line 5 - line 15; page 2, line 19 - line 24 --	1-2

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7 Sept 1994	14 -09- 1994
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INTERNATIONAL SEARCH REPORT

Information patent family members

30/07/94

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE-B- 304100	16/09/68	NONE	
US-A- 3412515	26/11/68	NONE	
EP-A2- 0121915	17/10/84	SE-T3- 0121915	
		CA-A- 1228462	27/10/87
		US-A- 4599841	15/07/86